

State of Illinois  
Department of Transportation

**CONSTRUCTION INSPECTOR'S CHECKLIST  
FOR  
BITUMINOUS SHOULDERS**

This checklist has been prepared to provide the field inspector a summary of easy-to-read step-by-step requirements relative to the proper construction of Bituminous Shoulders. The following questions are based on information found in Standard Specifications, Highway Standards, Construction Manual and current policy memorandums and letters.

Have you checked the contract Special Provisions, Supplemental Specifications and Plans .

**1. GENERAL**

The work shall consist of constructing a bituminous shoulder on a prepared subgrade, existing paved shoulder, or subbase. (Section 482 of the Standard Specifications)

**2. SHOULDER GRADES**

- a. Calculate and mark on the pavement edge, for both tangent and superelevated areas, the subgrade cut and offset for the shoulder structure shown on the plans.
- b. Prior to bituminous placement, the earth subgrade should be checked with an instrument or hand template to ensure the required depth and cross section of the completed shoulder will be obtained. Refer to THICKNESS TESTS.

**3. SUBGRADE**

The subgrade shall be prepared according to Article 312.10 and Section 301 of the Standard Specifications except Articles 301.04 and 301.05 will not apply.

The subgrade shall be compacted to not less than 95% of the standard dry density. The in place density of the completed shoulder subgrade will be tested every 450 m (1500 ft.) ([Sampling Schedule I](#), PPG or Special Provisions).

When bituminous shoulders are constructed adjacent to a pavement constructed on an improved (lime-modified) subgrade and additional material is needed to extend the improved subgrade to the bottom of the bituminous shoulder, the additional material shall be subbase granular material, Type C, conforming to Section 311 (Art. 482.04 and Standard 482001).

The subgrade shall be drained during the placing and compacting of the bituminous shoulder by cutting lateral ditches through any adjacent berms of earth.

#### 4. **PIPE UNDERDRAINS**

Placement of underdrains, when specified, should be in accordance with Section 601 of the Standard Specifications and Standard 601001.

- a. The pipe material shall conform to the requirements of Article 601.02.
- b. When 100 mm (4 in.) diameter underdrains are used, the trench width will be a maximum of 300 mm (12 in.) and the depth of trench will be as detailed in the plans or as shown on Standard 601001.
- c. Perforated Corrugated Polyethylene (PE) tubing underdrain trenches shall be placed in a semi-circular bedding groove of undisturbed material (Art. 601.04(b)). Pipe underdrain, other than PE tubing and Drainage Mat will be placed on a 25 mm (1 in.) layer of bedding material.
- d. Pipe underdrain trenches will be backfilled with FA-01 or FA-02 unless otherwise specified. Check Sheet 25, Special Provisions for Pipe Underdrains, specifies the use of CA-16 in lieu of FA-01 or FA-02, and also specifies the trench to be wrapped using a Fabric Envelope. The backfill will be compacted according to Articles 601.04(b) or 601.04(d).
- e. Pipe Underdrains (Special) shall be used for outletting the pipe underdrains. The pipe underdrain (special) shall provide an outlet across the shoulder to the ditch at intervals detailed in the plans, with a maximum spacing of approximately 150 m (500 ft.) and at all low points in the flowline of the pipe underdrains. Article 601.04(a).

#### 5. **MECHANICAL SPREADER**

The mechanical spreader shall be a spreading and finishing machine (paver) meeting the requirements of Article 1102.03 or it may be a type approved by the engineer. (Art. 312.04)

- a. The nominal 50 mm (2 in.) compacted top lift of shoulder shall be placed with a finishing machine (paver) that meets the requirements of Article 1102.03 when the shoulder width is 3m (10 ft.) or greater. (Art. 428.06)
- b. The bottom lift or lifts of shoulder shall be placed with a machine operated on the pavement (Art. 428.06).

**6. PLANT AND MATERIALS**

Bituminous Aggregate Mixture (BAM) will meet the following requirements:

- a. Materials will meet the requirements of Article 482.02. \_\_\_\_\_
- b. Hot-Mix Plant will meet the requirements of Article 312.04. \_\_\_\_\_
- c. The amount of bituminous used in the nominal 50 mm (2 in.) top lift shall be increased up to 0.5 percent more than required for the bottom lifts. (Art. 482.05) \_\_\_\_\_

Class I mixture option, will meet the following:

- a. Refer to Construction Inspector's Checklist for Bituminous Concrete Binder and Surface Courses, Class I, for plant and materials approval. \_\_\_\_\_
- b. The bitumen used in the top lift shall not be increased when Class I mixture is used. (Art. 482.05) \_\_\_\_\_
- c. Class I mixture used on the top lift of shoulders shall meet the gradation requirements of a B Binder or a Surface Course mixture and/or QC/QA mix design requirements. (Art. 482.05) \_\_\_\_\_
- d. Shoulder resurfacing widths of 1.8m (6 ft.) or less may be placed, at the contractor's option, simultaneously with the adjacent traffic lane. The paver shall operate with both tracks/drive wheels on the traffic lane. \_\_\_\_\_
- e. Class I Binder and Surface Course mixtures shall be used for shoulder strip construction, and the mixture shall be the same as that specified for the main line resurfacing (Art. 482.04 and Art. 482.05). Note: The shoulder strips are detailed on Standard 482011. The 300mm (12 in.) wide "strip" is placed simultaneously with the mainline resurfacing. \_\_\_\_\_

**7. MIXTURE & AIR TEMPERATURE REQUIREMENTS**

The following shall apply when BAM is used:

- a. No mixture shall be placed on a frozen or muddy roadbed. \_\_\_\_\_
- b. The BAM should be delivered at a temperature not to exceed 165°C (325° F). If RAP material is used in the BAM, the temperature shall not exceed 175°C (350°F). \_\_\_\_\_

When Class I binder or surface is used, mix delivery and air temperature requirements will conform to Construction Inspector's Checklist for [Bituminous Concrete Binder and Surface Course, Class I](#). \_\_\_\_\_

**8. TRUCK REQUIREMENTS**

When BAM is used, the transportation of the mixture shall conform to Article 406.14, except no truck insulation or covering will be required during inclement weather if the mix temperature behind the spreader is 95°C (200° F) or higher. (Art. 312.09)

When Class I mixture is used, the transportation requirements shall conform to Article 406.14. Refer to the Truck Requirements specified in the Construction Inspector's Checklist for [Bituminous Concrete Binder and Surface Course, Class I](#).

**9. TEMPERATURE RECORDS**

Occasional temperature checks shall be taken and recorded from the delivered material in the truck and behind the spreading machine.

**10. PLACING AND COMPACTING**

The bituminous mixture shall be spread to provide a maximum compacted layer of 150 mm (6 in.) provided the required density is obtained. (Art. 312.10)

The top lift shall be a nominal 50 mm (2 in.) compacted layer. (Art. 482.06)

Each layer shall be compacted using:

- a. A vibratory compactor and a roller, or
- b. Two rollers
- c. If the density of a layer is less than required, additional compaction and/or the use of an additional roller will be required.

Note: In small, variable and/or confining areas not to exceed 2500 m<sup>2</sup> (3000 sq yd) or 300 m (1000 ft) per day, only one roller will be required.

**11. ROLLER REQUIREMENTS**

Rollers shall be operated at speeds not to exceed 50 m (175 ft) per minute, and they shall meet the following requirements (Art. 312.04 & Art. 312.10):

- a. Three-wheel and tandem rollers, 5.5 to 11 metric tons (6 to 12 tons) total weight; 33 to 70 N/mm (190 to 400 pounds per inch) of width on drive wheel(s).
- b. Self-propelled pneumatic-tired roller; not less than 53 N/mm (300 pounds per inch) of width of tire tread in contact with the bituminous surface, tire pressure, 415 to 825 kPa (60 to 120 psi).

- c. Vibrating rollers shall meet the requirements of Article 1101.01(g). \_\_\_\_\_
- d. Trench roller, 53 to 70 N/mm (300 to 400 pounds per inch) of width on the compaction wheel. \_\_\_\_\_

## 12. **DENSITY REQUIREMENTS**

The bituminous shoulder shall be compacted to meet the following density requirements (Art. 482.06):

- a. The first layer shall be compacted to not less than 90% of the theoretical density. \_\_\_\_\_
- b. Subsequent layers shall be compacted to not less than 92% of the theoretical density. \_\_\_\_\_
- c. The density of each layer will be obtained by approved nuclear methods or from specimens furnished by the contractor as specified in Article 406.16.

Note: When Special Provision for QC/QA of Bituminous Concrete Mixtures is included in the contract, the required density and field tests for Non-Class I Bituminous Concrete Mixtures (BAM) will be performed as indicated. A growth curve for BAM only mixtures will be performed for each type of BAM mix and each lift within the first 180 metric tons (200 tons) of placement. A target density will be established from the growth curve, and all lifts shall be compacted to an average density of not less than 95% nor greater than 102% of the target density obtained on the growth curve.

- d. Density testing frequency is one test per 800 m (1/2 mile) per lift, per side, randomly located. ([Sampling Schedule 4](#), PPG or Special Provisions). \_\_\_\_\_

## 13. **THICKNESS TEST**

The thickness of the bituminous shoulder will be checked at least every 300 m (1000 ft) when the shoulder is constructed and paid for as a square meter (square yard) unit of measure. (See [Documentation Section](#) of the Construction Manual)

- a. Before and after cross sections with a rod and level, or before and after measurements taken from an established reference elevation such as a stringline or edge of pavement. \_\_\_\_\_
- b. Shoulder areas less than 90% of the plan nominal thickness shall be brought to the proper thickness by placing additional shoulder material or by complete removal and replacement of the deficient shoulder area. \_\_\_\_\_

- c. If corrective action is needed, the final shoulder elevation shall not exceed the plan elevation or elevation established by the engineer by more than 3 mm (1/8 in).

#### 14. **RUMBLE STRIPS**

When required, rumble strips shall be formed by use of a modified roller drum after finish rolling (Art. 482.06).

- a. Rumble strip pattern will be as shown on the plans or Standard 482101.
- b. Unless otherwise specified, the contractor shall have the option of using either continuous or intermittent corrugations. (Standard 482101)
- c. Corrugations shall be omitted when falling within the limits of a sideroad, entrance or ramp entrance and exit.
- d. Modified roller shall be equipped with a sighting device to maintain proper alignment.
- e. Modified roller shall have a minimum weight of 9 metric tons (10 tons) or be of sufficient weight to obtain desired corrugations.
- f. A final pass with a finish roller, when directed by the Engineer, shall be made after the rumble strips are formed.

#### 15. **DOCUMENTATION OF FINAL CONTRACT QUANTITIES**

When bituminous shoulders are constructed along the edges of the completed pavement structure, the bituminous shoulder will be paid for at the contract unit prices per square meter (square yard) for Bituminous Shoulders of the thickness specified. The method of measurement shall be as follows:

- a. Contract Quantities – The requirements for the use of contract quantities shall conform to Article 202.07(a).
- b. Measured Quantities – The shoulder shall be measured in place and the area completed in square meters (square yards). The width for measurement will be from the edge of the pavement to the top edge of the bituminous shoulder as shown on the plans or as directed by the engineer.

When existing shoulders are overlaid in conjunction with a pavement and shoulder resurfacing project, bituminous shoulders will be measured for payment in metric tons (tons), according to Article 406.23, except the requirement that payment will not be made for any bituminous concrete mixture in excess of 103% of the quantity specified by the engineer will not apply.

When the contractor chooses the option to place bituminous shoulders using Class I, Type I, and 2 mixture simultaneously with the traffic lane, the following shall apply:

- a. The quantity of bituminous mixture placed on the traffic lane will be limited to a calculated tonnage based upon actual mat width and length, plan thickness or a revised thickness authorized by the engineer, and design mix weight per millimeter (in.) of thickness.
- b. The difference between the total actual tonnage placed and the calculated tonnage used on the traffic lane will be measured and paid for as Bituminous Shoulders according to Section 482 of the Standard Specifications.

When a bituminous concrete wedge is placed simultaneously with the binder course as specified in Article 406.20, the quantity of binder course placed on the traffic lane will be limited to 103% of the quantity specified by the engineer. The difference between the total actual tonnage placed and 103% of the tonnage specified by the engineer will be measured and paid for as Bituminous Shoulders according to Section 482 of the Standard Specifications.

The Class I binder and surface course mixtures used in construction of shoulder strips for pavement resurfacing will be measured for payment in metric tons (tons) as specified in Article 406.23, except that the thickness of surface course will be limited to that specified for the adjacent resurfacing. Surface course used in excess of this amount will be measured for payment as binder course.

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